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**Consultative
Committee for
Space Data Systems**

**RECOMMENDATION FOR SPACE
DATA SYSTEM STANDARDS**

**STANDARD FORMATTED
DATA UNITS--
CONTROL AUTHORITY
PROCEDURES**

CCSDS 630.00-R-1.1

RED BOOK

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(WHEN THIS RECOMMENDATION IS FINALIZED IT WILL CONTAIN AN AUTHORITY STATEMENT WHICH IS SIMILAR TO THE FOLLOWING:)

This Recommendation reflects the consensus technical agreement of the following member Agencies of the Consultative Committee for Space Data Systems (CCSDS):

- British National Space Center / Rutherford Appleton Laboratory (BNSC/RAL)/United Kingdom
- Canadian Space Agency (CSA)/Canada
- Centre National d' Etudes Spatiales (CNES)/France
- Deutsche Forschungsanstalt fuer Luft und Raumfahrt e. V. (DLR)/West Germany
- European Space Agency (ESA)/Europe
- Instituto de Pesquisas Espaciais (INPE)/Brazil
- National Aeronautics and Space Administration (NASA)/USA
- National Space Development Agency of Japan (NASDA)/Japan

The following observer Agencies also concur with this Recommendation:

- Indian Space Research Organization (ISRO)/India
 - observers
- (WHEN THIS RECOMMENDATION IS FINALIZED THIS LIST WILL BE THE ACTUAL OBSERVER AGENCIES THAT HAVE CONCURRED)

This Recommendation is published and maintained by:

CCSDS Secretariat
Communications and Data Systems Division (Code-TS)
National Aeronautics and Space Administration
Washington, DC 20546, USA

STATEMENT OF INTENT

(WHEN THIS RECOMMENDATION IS FINALIZED IT WILL CONTAIN THE FOLLOWING STATEMENT OF INTENT:)

The Consultative Committee for Space Data Systems (CCSDS) is an organization officially established by the management of member space Agencies. The Committee meets periodically to address data systems problems that are common to all participants, and to formulate sound technical solutions to these problems. Inasmuch as participation in the CCSDS is completely voluntary, the results of Committee actions are termed Recommendations and are not considered binding on any Agency.

This Recommendation is issued by, and represents the consensus of the CCSDS Plenary body. Agency endorsement of this Recommendation is entirely voluntary. Endorsement, however, indicates the following understandings:

- Whenever an Agency establishes a CCSDS-related Standard, this Standard will be in accord with the relevant Recommendation. Establishing such a Standard does not preclude other provisions which an Agency may develop.
- Whenever an Agency establishes a CCSDS-related Standard, the Agency will provide other CCSDS member Agencies with the following information:
 - The Standard itself.
 - The anticipated date of initial operational capability.
 - The anticipated duration of operational service.
- Specific service arrangements shall be made via memoranda of agreement. Neither this Recommendation nor any ensuing Standard is a substitute for a memorandum of agreement.

No later than five years from its date of issuance, this Recommendation will be reviewed by the CCSDS to determine whether it should: (1) remain in effect without change; (2) be changed to reflect the impact of new technologies, new requirements, or new directions; or, (3) be retired or canceled.

FOREWORD

(WHEN THIS RECOMMENDATION IS FINALIZED IT WILL CONTAIN THE FOLLOWING FOREWORD:)

This document is a technical Recommendation for the standardization of the Control Authority (CA) procedures for supporting the digital transfer of space-related information in an open data system using Standard Formatted Data Units (SFDUs), and has been prepared by the Consultative Committee for Space Data Systems (CCSDS). Other aspects of the SFDU concept are described in documents listed in the Reference section.

This Recommendation defines the minimum responsibilities, services, and interface protocols that must be adopted by the Agencies in order to facilitate the creation of interoperable organizational entities, called Member Agency Control Authority Offices (MACAOs), whose function is to register and disseminate data description information in an open data system environment.

This Recommendation also defines the minimum responsibilities, services, and interface protocols that must be adopted by the CA Agent whose function is to support the CCSDS Secretariat in the registration of Agency MACAOs, in the collection and dissemination of summary information on MACAO registered data description information, and in the dissemination of data description information as contained in CCSDS Recommendations on the SFDU concept.

Through the process of normal evolution, it is expected that expansion, deletion, or modification to this document may occur. This Recommendation is therefore subject to CCSDS document management and change control procedures which are defined in Reference [1]. In particular, evolution of technology and operational experience will likely lead to an expansion in the minimum responsibilities, services, and protocols.

Questions relative to the contents or status of this document should be addressed to the CCSDS Secretariat at the address indicated on page i.

DOCUMENT CONTROL

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REFERENCES

- [1] "Procedures Manual for the Consultative Committee for Space Data Systems," Consultative Committee for Space Data Systems, Issue-2, May 1988 or later issue.
- [2] "Report Concerning Space Data System Standards: Space Data Systems Operations with Standard Formatted Data Units: Systems and Implementation Aspects," CCSDS 610.0-G-5, Green Book, Issue 5, February 1987 or later issue.
- [3] "Recommendation for Space Data Systems Standards: Standard Formatted Data Units--Structure and Construction Rules," CCSDS 620.0-B-1, Blue Book, Issue-1, February 1988 or later issue.
- [4] "Standard Formatted Data Units - Control Authority Operations," CCSDS 630.02-G-1.3, Chartreuse Book, Issue 1, September 1990 or later issue.

The latest issues of these documents may be obtained from the CCSDS Secretariat at the address indicated on page i.

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this document is to establish a set of minimum and optional requirements for the implementation of Control Authority (CA) organizations within and among the Agencies participating in the Consultative Committee for Space Data Systems (CCSDS). By satisfying these requirements, the resultant cooperating set of CA organizations will produce a global CA service supporting information transfer with digital data under the Standard Formatted Data Unit (SFDU) concept. This service is primarily accomplished through the registration, permanent archiving, and dissemination of metadata in the form of Metadata Objects (MDO) that assist in the interpretation of data objects received in SFDU form.

This Recommendation addresses the responsibilities, services, and interface protocols for a hierarchy of CA organizations. The top level, consisting of the CCSDS Secretariat and its operational agent, is unique and primarily provides a global coordination function. The lower levels are Agency CA organizations that have primary responsibility for the registration, archiving, and dissemination of MDOs. As experience is gained and technology evolves, the CA Procedures will be extended to include enhanced services and their supporting protocols. In particular, it is anticipated that eventually CA organizations will be linked via networks on a global basis, and will provide requestors with online automated access to CA services. While this Recommendation does not preclude such operations, it also does not recommend the specific protocols to be used to ensure global compatibility of these services. These Recommendations will be generated as experience is gained.

The operating principles and procedures for the CCSDS are defined in Reference [1]. The general SFDU data interchange concept and the initial role of the CA are described in Reference [2]. This document provides an inter-Agency coordination mechanism that ensures that compatible implementations are facilitated.

1.2 APPLICABILITY

This Recommendation serves as a guideline for the development of internal Agency standards related to the management and transfer of information in digital form using SFDUs. This Recommendation applies to the archiving and dissemination of descriptions about data (metadata). This metadata describes data as transferred in the form of SFDUs between users associated with projects, archives, and real-time operations, including command generation and receipt, as well as data routing.

The SFDU concept includes the concepts of standard data and metadata packaging techniques, globally unique identifiers linking the data and metadata packages, and automated interpretation of data and metadata packages when the metadata packages are expressed in a formal data language. A Recommendation on data packaging is presented in Reference [3].

To be fully compatible with the SFDU concept, an Agency must use one of the structures of a data unit that are defined by the relevant Recommendations of Reference [3], and must provide MDOs containing the necessary metadata. The details of expressing the MDO content in a data language may be accomplished in the most appropriate manner until standards are recommended by CCSDS. The MDOs should be submitted in the form of a Registration Package (RP) to a CA organization for registration as defined in this Recommendation. The

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CA organization will archive these MDOs and provide them to requestors in the form of Data Description Packages (DDP). RPs and DDPs should be exchanged in SFDU form.

The specifications in this document are to be invoked through the standards program of each Member Agency (MA) and are applicable to those missions and services for which cross-support, based on the need for open system information transfer, is anticipated.

1.3 RECOMMENDED APPROACH TO READING THE DOCUMENT

A proper understanding of this Recommendation requires familiarity with the SFDU concept and the specific meanings of the terminology used in this document. A complete summary of the acronyms and the terminology used internal to this document is presented in Annex A. It is recommended that this be read prior to reading the main body of the document.

2 CONTROL AUTHORITY ORGANIZATION AND DELEGATION OF RESPONSIBILITIES

The Control Authority (CA), an organization under the auspices of CCSDS, provides operational services in support of the transfer and usage of SFDUs through the registration, archiving, and dissemination of metadata objects (MDOs). This organization is composed of the following two primary organizational entities:

- 1) The CCSDS Secretariat, supported by a CA Agent designated to be World Data Center-A for Rockets and Satellites (WDC-A-R&S)
- 2) The primary Member Agency Control Authority Offices (MACAOs)

This structure is summarized in Figure 2-1

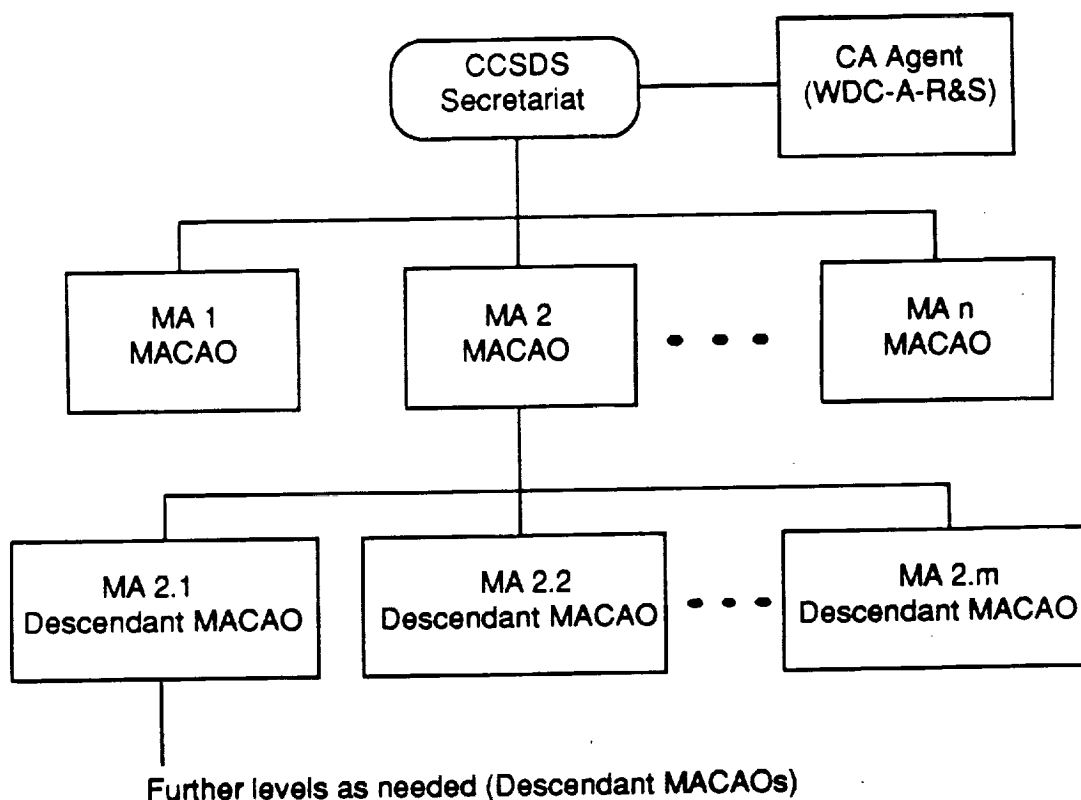


Figure 2-1. Control Authority Organizational Structure

Each *Member Agency* (MA) is free to organize its primary MACAO, and any descendant MACAOs, as it finds most appropriate. However the MACAO responsibilities, as given in Section 2.2, require a stable organization to provide permanent archival of MDOs. Thus each MA may find it appropriate to designate a MACAO organization that discharges the major operational responsibilities of one or more MACAOs, much as the CA Agent does for the CCSDS Secretariat.

2.1 CONTROL AUTHORITY IDENTIFIER

Each MACAO, and the CCSDS Secretariat together with its CA Agent, is globally identifiable through its unique CA Identifier (CAID). The structure of the four CAID characters can be represented as follows:

XXXX = CAID

Where X = *MA Identifier (MAID)* (character from the Restricted ASCII (RA) character set)

YYY = *Local MACAOID* (three RA character identifier used to distinguish MACAOs within a MA)

The responsibility for assigning these characters is described in the following Sections.

2.2 CONTROL AUTHORITY RESPONSIBILITIES OF CCSDS SECRETARIAT

The CCSDS Secretariat, supported by its Agent, facilitates global coordination and communication of CA operations. It does this by discharging the responsibilities in the following Sections. (See Section 3.1 for a discussion of the services and operations concerned with these responsibilities.)

2.2.1 Mandatory Responsibilities

1. Assigns a single unique MAID character to each MA which intends to operate a MACAO, and publicizes this assignment. This assignment shall be consistent with Annex C.
2. Registers and publicizes the CAIDs from each MA corresponding to the primary MACAO, and/or any descendant MACAOs. The corresponding organizational structure is also registered and publicized. Each registration shall be consistent with CCSDS Recommendations.
3. Registers, publicizes, and maintains an open log of MACAOs, and descendant MACAOs, locations and access methods.
4. Disseminates MDOs that are defined in CCSDS Recommendations.
5. Publishes a compendium of all MDOs registered with all MACAOs. This compendium includes 2 or 3 lines of description for each MDO.
6. Publishes statistics on the request activity of the CA Agent and all MACAOs.

2.2.2 Optional Responsibilities

These responsibilities are desirable and may be discharged as resources permit.

1. Assists in the creation and exchange of software to facilitate *building*, parsing and interpretation of SFDUs, including the archiving, registration, and dissemination of such software. This also includes the publication of *SFDU* software availability information, and serving as a switching center, for requests, to other organizations or offices providing such software.
2. Assists in the reuse of MDOs and the use of standard MDOs (i.e., MDOs established in a CCSDS Recommendation), primarily through publication of availability notices.
3. Assists communication between and among SFDU users and ~~service~~ suppliers of needed services.

2.3 CONTROL AUTHORITY RESPONSIBILITIES OF MACAOs

The MACAOs are expected to handle most of the daily service required by *different types of* SFDU users, (e.g., *Registration Package Providers, MDO Requestors, and other MACAOs*) and therefore they will each have to be provided with Agency resources commensurate with the responsibilities of the following Sections. (See Section 3.2 for a discussion of the services and operations concerned with these responsibilities.)

2.3.1 Mandatory Responsibilities

1. Registers, and permanently archives, those MDOs which have been submitted to it in accordance with applicable Recommendations. Disseminates these MDOs to all requestors, consistent with CCSDS and Agency requirements and limitations.
2. *In the case of a delegation to descendant MACAOs, p*Provides all written guidelines, standards, and instructions needed by each descendant MACAO (*see section 2.3.2*) to maintain the necessary global and Agency wide compatibility and consistency. If a descendant MACAO becomes inoperative, its immediate parent MACAO shall assume responsibility for archiving and disseminating those MDOs which had been the responsibility of the now inoperative MACAO.
3. Provides the CCSDS Secretariat with notification of the Agency's intent to terminate CA functions, and attempts to reach an agreement with the CA Agent on the transfer of all MACAO registered MDOs, within the Agency, to an active MACAO in another Agency.
4. Ensures that each CAID for all descendant MACAOs is unique within the Agency, and that all IDs assigned by the Agency are unique.
5. Registers all CAIDs and associated organizational structures with methods of access to the primary and each descendant MACAO. Maintains an open log of this information for all requestors.

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6. Maintains statistics on the request activity.
7. Provides the CA Agent, through the primary MACAO, with an annual report on the complete MA organizational structure of all Agency MACAOs, their registered MDOs, and request activity statistics.

2.3.2 Optional Responsibilities

These responsibilities are desirable and may be discharged as resources permit.

1. Delegates to organizational units, within the Agency or associated with the Agency, the responsibility for registering and archiving MDOs, thereby defining descendant MACAOs as appropriate for each Agency. Should the Agency decide to delegate such registering and archiving authority to a non-Agency organization, the Agency nevertheless maintains overall responsibility.
2. Assists in the creation and exchange (*both between MACAOs and between MACAOs and other SFDU users*) of software to facilitate building, parsing and interpretation of SFDUs, including the archiving and dissemination of such software. This also includes the publication of SFDU software availability information, and serving as a switching center, for requests, to other organizations or offices providing software.
3. Assists in the reuse of MDOs consistent with Agency priorities.
4. Assists communication between and among SFDU users and suppliers of needed services.
5. Provides the CCSDS Secretariat with any useful information concerning CA operations to improve CCSDS Recommendations and reports, and to facilitate the discharging of Secretariat CA responsibilities.

3 SERVICES AND OPERATIONS

The services defined below enable discharge of CA responsibilities in a globally compatible manner. This will guarantee a minimum level of uniformity to users of these services, while simultaneously allowing individual MACAOs to provide enhanced services. As the level of available technology for enhanced services increases, it is anticipated that the minimum level will be raised accordingly. The current level of conformance is depicted in Appendix D. Services and operations for the CA Agent, and for each MACAO or descendant MACAO, follow in Sections 3.1 and 3.2 respectively.

3.1 CA AGENT SERVICES AND OPERATIONS

3.1.1 Request Processing

The CA Agent shall accept those requests for information regarding CA Agent services, and shall provide standard responses that cover communications, organization and identification codes, registration and dissemination services, and CCSDS publications. The CA Agent shall provide the following services:

1. Upon receipt of a request, the CA Agent shall acknowledge the request. All acknowledgements shall be disseminated as quickly as possible, but at least within five working days of receipt of the request.
2. Upon determination by the CA Agent of the probable date of request completion, this date shall be disseminated to the requestor. This date shall be disseminated within five working days of receipt of the request.
3. If the request cannot be fulfilled, for whatever reason, this fact, and the reason, shall be disseminated within five working days of receipt of the request.
4. Upon completion of the request by the CA Agent, the CA Agent shall disseminate the desired information to the requestor as quickly as feasible.

3.1.2 Registration/Dissemination

The CA Agent shall support the following MACAO registration and dissemination services:

1. Upon receipt of notification that a MA intends to organize a primary MACAO, the CA Agent shall assign an MAID character to that Agency and provide the MAID character, together with a copy of all applicable MACAO responsibilities and standards, to that MA.
2. Upon notification from a MA that a MACAO has been, or is being, organized, the CA Agent shall register the MACAOID characters chosen by the office, including any descendant MACAOIDs characters. This registration shall include MACAO organizational structure (if more than one office in the MA), office location, and access mechanisms. The MA shall be notified upon completion of registration. This registration information shall be available to requestors, and shall be publicized.

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The CA Agent shall support the following CCSDS Recommendation dissemination service:

3. Upon receipt of a request for an MDO with a CCSDS MDO identifier (called a CCSDS ADID) with a request for the associated MDO, the CA Agent shall provide the CCSDS Recommendation containing the definition of the MDO identified by that CCSDS ADID MDO identifier.

3.1.3 Publication

The CA Agent shall produce an annual report that publicizes CA services and includes the following categories of information:

1. MAIDs, MACAOIDs, organizational structure, location, and access methods.
2. Compendium of MDO information obtained from all MACAOs.
3. Compendium of CA Agent request activity statistics together with those obtained from each primary MACAO.
4. MDOs identified by MACAOs, as candidates for standardization. *Standardization occurs* through publication in CCSDS Recommendations.

3.1.4 Archiving

The CA Agent shall archive all registered information and ensure access to that information.

3.2 MACAO SERVICES AND OPERATIONS

3.2.1 Request Processing

The MACAO shall accept requests to register and disseminate MDOs, consistent with CCSDS and MA requirements. The MACAO, and all descendant MACAOs, shall accept those requests for information regarding its services. It shall provide standard responses concerning communications, organization and identification codes, registration and dissemination of MDOs, and publications. Otherwise, the MACAO shall direct a requestor, or request, to other organizations or offices that are able to respond to the request. The MACAO shall provide the following services:

1. Upon receipt of a request for either registration or dissemination of an MDO, the MACAO shall acknowledge the request. All acknowledgements shall be disseminated as quickly as possible, but at least within five working days of receipt of the request.
2. Upon determination by the MACAO of the probable date of a request for dissemination, request completion, this date shall be disseminated to the requestor. This date shall be disseminated within five working days of receipt of the request.
3. If the registration or dissemination request cannot be fulfilled, for whatever reason, this fact, and the reason, shall be disseminated to the requestor within five working days of receipt of the request.

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4. Upon completion of a dissemination request by the MACAO, the MACAO shall disseminate the desired information as quickly as feasible. *Unless specified, the latest revision of the MDO will be disseminated.*

3.2.2 Registration/Dissemination

The MACAO shall support the following MACAO and MDO registration and dissemination services:

1. Upon receipt of a request to ~~register support~~ the establishment of a descendant MACAO, the MACAO shall apply CCSDS and MA constraints in accepting the request. If the request is accepted, the MACAO shall ensure that any descendant MACAO has a unique ID within that MA, and that the descendant MACAO is provided with written guidelines and standards defining its responsibilities in order to maintain global archiving integrity. Upon the demise of any descendant MACAO, the parent MACAO shall assume the archiving and ~~dissemination distribution~~ responsibilities of the formerly descendant MACAO.
2. Upon the establishment or demise of a descendant MACAO within a MA, the primary MACAO shall notify the CA Agent of this addition or deletion in the MACAO organizational structure, including the MACAO ID characters, office location, and communication methods ~~access mechanisms~~.
3. Upon receipt of an MDO with a request for registration, the MACAO shall apply CCSDS and MA constraints in acceptance of the MDO, ~~and if it accepts the MDO, it accepted~~ shall assign the MDO a unique MACAO registration identifier (called a MACAO ADID, or ADID for short), ~~MDO registration ID~~ and archive the MDO for subsequent retrieval via its ADID and optionally revision number ~~the registration ID~~. The assigned ADID ~~registration ID~~ ~~shall should~~ be disseminated to the originator of the MDO. *If the request for registration cannot be fulfilled, that fact and the reason shall be disseminated to the originator of the MDO.*
4. Upon receipt of an MDO with a request to ~~revise that it replace~~ part or all of a previously registered MDO, the MACAO shall apply CCSDS and MA constraints in acceptance of the MDO, and if it accepts the MDO, ~~accepted~~ shall ensure that both the old and new revisions (both previous and new) of the MDO are available for subsequent retrieval via the ADID ~~MCAO registration ID~~ and optionally revision number. *If the request for revising a previously registered MDO cannot be fulfilled, that fact and the reason shall be disseminated to the originator of the MDO. (See Section 5.3 for clarification of MDO revision processing.)*
5. *Upon receipt of a request to register an MDO that contains references to previously registered MDOs (called Referenced MDOs), the MACAO shall first check for the existence of the Referenced MDOs (whether they are archived locally or at another MACAO). Upon determining that there are no obvious discrepancies either regarding the Referenced MDOs or the content of the MDO being registered, the MACAO shall assign a unique ADID to the MDO being registered. The MACAO shall archive the MDO for subsequent retrieval by its assigned unique ADID.*

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65. Upon receipt of a request for an MDO registered under a given MACAO MDO registration ID (called a MACAO ADID) ~~from a requestor~~, the MACAO shall provide the MDO registered under that ADID and optionally ~~together with~~ any other MDOs whose ADIDs appear explicitly in the requested MDO, these "other" MDOs are called Referenced MDOs. If the Referenced MDOs are not stored locally, the MACAO receiving the request shall contact other MACAOs to request and obtain the Referenced MDOs. The latest revision of every Referenced MDO and the requested MDO shall be provided ~~MACAO MDO registration IDs are referenced from the MDO.~~

3.2.3 Publication

The primary MACAO shall support CCSDS publication of an annual report on CA services by providing an annual written report, to the CA Agent, containing the following information:

1. A complete summary of all MA registered MDOs including those at its descendant MACAOs. *The contents for the summary shall be provided by the descendant MACAO within the Member Agency.*
2. A summary of request activity statistics for the MACAO and its descendant MACAOs. *The statistics shall be provided by each descendant MACAO to its ascendant MACAO from each MACAO within the Agency.*
3. A summary of widely used MDOs, as reported by each of the descendant MACAOs and the primary MACAO, ~~is made by the primary MACAO.~~ These widely-used MDOs are considered candidates for standardization. Standardization occurs through publication in CCSDS Recommendations. ~~A summary of MDOs widely used, as known to the MACAO, and MDOs which are candidates for standardization through publication in CCSDS Recommendations.~~
4. A complete summary of the MA CA organizational structure.

3.2.4 Archiving

The MACAO shall archive all registered information and ensure access to that information.

4 CA AGENT SUPPORT FOR BASIC SERVICES AND OPERATIONS

In support of the services outlined in Section 3, this Section provides details about:

CA Agent Communications (4.1) - methods for establishing communication with the CA Agent.

MAID Registration (4.2) - requirements for the assignment and registration of a unique character to a Member Agency.

MACAOID Registration (4.3) - requirements for the registration of a character string identifying each MACAO, and the registration of associated organizational, location, and access information.

CCSDS Recommendation Dissemination (4.4) - requirements for dissemination of CCSDS Recommendations to requestors.

CA Annual Report (4.5) - requirements for the content, packaging, and distribution of a report giving the CA services and a summary of available products.

4.1 CA AGENT COMMUNICATIONS METHODS

The CA Agent shall be able to communicate with users of its services through use, at a minimum, of the following methods:

1. Mail
2. Telephone
3. Facsimile
4. Electronic Mail

Annex E contains addresses for these methods, current as of the publication date of this Recommendation.

4.2 MEMBER AGENCY ID REGISTRATION PROTOCOLS

4.2.1 MAID Assignment

An MA that does not have an assigned MAID character and that wishes to participate as a CA organization must notify the CA Agent of this intent. The MA may request a specific MA-ID RA character *for its MAID*, but the final determination shall be made by the CCSDS Secretariat. This character shall be publicized, and in usage *shall must precede* all other MA-CA-ID characters *in the CAID* used to designate various descendant MACAOs.

4.2.2 MAID Assignment Requests

The MA shall use an acceptable communications method (Section 4.1), and shall include the following information:

1. Name of MA
2. Name of MA representative to CCSDS
3. Address of MA representative

4.2.3 CA Agent Responses

The CA Agent shall respond in writing to the indicated address with the approved MAID character, and additional information that may be of use in setting up a MACAO. The character assigned shall conform to all restrictions defined in the CCSDS Recommendation on structure [3].

4.3 MACAO ID REGISTRATION PROTOCOLS

An MA that wishes to set up a MACAO must register that office, and any descendant offices, with the CCSDS Secretariat. This procedure will be handled by the CA Agents. The MA must use its MAID character as the first character of all of its MACAO CAIDs. The final three characters of the four character CAID, referred to as the Local MACAOID, distinguish MACAOs within a MA. This structure has been previously described in Section 2.1.

~~An initial Annex C contains a set of Agency and MACAO identifiers is given in Annex C~~ current as of the publication date of this Recommendation. Updates to this list can be obtained from the CA Agent.

4.3.1 Primary MACAO Registration

The MA shall register its primary MACAO, and shall use an acceptable communications method (Section 4.1) to contact the CA Agent. The following information shall be included:

MA Identification

1. Name of MA
2. Name of MA representative to CCSDS
3. Address of MA representative
4. MAID, if previously assigned

Primary MACAO Identification

5. Local MACAO ID to be registered for this primary MACAO
6. Name of this MACAO
7. Name of principal contact at this MACAO (person or position)
8. Name of secondary contact at this MACAO (person or position)
9. Physical location of this MACAO (e.g., building, city, country)
10. Mail address of this MACAO
11. Telephone No. of this MACAO

4.3.2 Descendant MACAO Registration

The primary MACAO is responsible for ensuring the registration of all *new* (descendant) MACAOs with the CA Agent, and for ensuring that all MACAO CAIDs are unique within the Agency. The following information shall be included:

MA and Primary MACAO Identification

1. Name of MA
2. Name of primary MACAO
3. CAID of primary MACAO
4. Name of contact at primary MACAO (position or person)
5. Mail address of primary MACAO

Descendant MACAO Identification

6. Local MACAO ID to be registered for *descendant new* MACAO
7. Name of *descendant new* MACAO
8. Name of contact at *descendant new* MACAO (person or position)
9. Physical location of *descendant new* MACAO (e.g., building, city, country)
10. Mail Address of *descendant new* MACAO
11. Telephone No. of *descendant new* MACAO
12. CAID of the *descendant parent* MACAO (i.e., the MACAO directly responsible for the *new* {descendant} MACAO)

4.3.3 CA Agent Responses

Upon receipt of the registration material identified in Sections 4.3.1, or 4.3.2, the CA Agent shall verify the conformance of the proposed Local MACAO ID to the requirements of three characters in length, uniqueness within the MA, and Annex E. The CA Agent shall respond by mail, within five working days, with either a confirmation of the registration or the reason(s) for rejection. This response shall be addressed to the corresponding contact at the primary MACAO, or to the MA representative as appropriate.

4.4 CCSDS RECOMMENDATION DISSEMINATION PROTOCOLS

The CA Agent shall disseminate CCSDS Recommendations in a manner that meets the following criteria.

4.4.1 Recommendations

A Recommendation may contain one or more CCSDS MDO identifiers ~~called a CCSDS ADID, and its associated definition (MDO).~~ The identifiers are called CCSDS ADIDs. The Recommendation provides the *specification for each meaning of its* included CCSDS ADIDs. Each Recommendation shall have CCSDS Blue Book status.

4.4.2 CCSDS ADID

A CCSDS ADID shall be recognized by the following attributes:

1. Comprised of eight-character sequence.
2. First four characters are the sequence CCSD.
3. Last four characters are taken from the RA character set.

4.4.3 Response to CCSDS ADID Requests

The CA Agent shall be responsible for providing copies of a Recommendation to responsible individuals or organizations requesting the MDOs registered under one of the CCSDS ADIDs defined in the Recommendation. This response shall include all additional Recommendations needed to define any MDOs referenced through the initial Recommendation. The CA Agent shall provide the Recommendations on the media that it finds most convenient, but may elect to provide them on other media, as requested, if resources permit.

4.5 CA ANNUAL REPORT PROTOCOL

The CA Agent is responsible for publishing and making available an annual report detailing CA services and available products. The content of this report shall include:

1. All MAIDs, MACAO IDs, organizational structure, locations, and *communications access methods*
2. For all MDOs registered with the MACAO, the following information:
 - a. MACAO CAID
 - b. Brief title (40 characters or less)
 - c. Revision number of MDO
 - d. Brief description, in English, of MDO (100-200 characters)
 - e. MDO revision type (Revisable or Non-revisable)
3. Summary of CA Agent and MACAO request activity statistics, including the following:
 - a. Number of MA and MACAO IDs assigned during the past year
 - b. Number of CCSDS Recommendations distributed during the past year
 - a. Number of MACAO ADIDs assigned during the past year
 - b. Number of MDOs revised during the past year
 - c. Number of requests received during the past year
4. ~~of~~ All registered MDOs that may be candidates for standardization, *which occurs through publication in CCSDS Recommendations.*

4.5.1 CA Annual Report Distribution

This annual report should be distributed by April 1 of the following year.

The report shall be made available in hardcopy form, but distribution may also be via microforms, electronic media, or other physical media as determined by the CA Agent. A copy of this report shall be provided to the CCSDS Secretariat, all ~~M~~member and observer Agencies, and all MACAOs. Copies may also be provided to requestors as resources allow.

5 MACAO SUPPORT FOR SERVICES AND OPERATIONS

In support of the basic services outlined in Section 3, this Section provides details about:

MACAO Communications (5.1) - methods for establishing communication with a MACAO.

MACAO MDO Registration/Dissemination (5.2) - requirements for the registration of MDOs and the requirements for dissemination of these MDOs to requestors.

MACAO MDO Revisions (5.3) - requirements for the revision of previously registered MDOs.

MACAO Annual Report (5.4) - requirements for the content of summary information on Agency MACAO organization, products, and operations to be delivered to the CA Agent.

5.1 MACAO COMMUNICATIONS METHODS

Communications may be established with a MACAO using any of the following methods:

1. Mail
2. Telephone
3. Facsimile
4. Electronic Mail

It is highly desirable that MACAOs be linked via electronic networks.

5.2 MACAO MDO REGISTRATION/DISSEMINATION PROTOCOLS

MACAOs will register and disseminate MDOs to responsible individuals or organizations, as determined by each Agency.

An MDO (possibly comprised of other MDOs) may be submitted for registration under a single MACAO MDO registration ID, called a MACAO ADID. Each of these submitted MDOs may, in turn, reference other previously registered MDOs (both MACAO and CCSDS) by their ADIDs. The ADIDs of the Referenced MDOs may appear within any of the MDOs within the requested MDO. (NOTE: reference to MDOs not under the control of a MACAO, though not excluded, may jeopardize future access to the associated data in the event the external authority disappears.)

When a MACAO receives a request for the MDO registered under one of its MACAO ADIDs, the MACAO shall provide the requestor with that MDO and all other MDOs that are referenced by MACAO ADIDs within the requested MDO.

5.2.1 MDO Registration

An MDO (possibly comprised of other MDOs by presence and by reference), to be registered under a single ADID, shall be submitted to a MACAO in the form of a Registration Package (RP). The submission requirements for this MDO are categorized and discussed separately below as RP Presubmission Information and RP Content.

5.2.1.1 RP Presubmission Information

The RP Presubmission Information must be complete enough to enable the MACAO to find and extract the RP Content from the underlying medium on which the RP is submitted.

5.2.1.1.1

RP Presubmission Information shall include:

1. Specification of the physical or electronic media on which the RP is being supplied.
2. Mapping information relating the RP Content to the physical or electronic media on which it is being supplied.

5.2.1.1.2 The RP Presubmission Information must be negotiated with the MACAO using the communication methods of Section 5.1, or other methods acceptable to the MACAO, prior to submission of the RP to the MACAO. Once negotiated, unless changes occur, there is no need to submit presubmission information for future transmissions. The actual presubmission information requirements are determined by the individual MACAOs.

5.2.1.2 RP Content

The RP Content shall be viewed as an MDO comprised of a sequence of two or more MDOs.

5.2.1.2.1 The 'first' MDO in the RP is called the Identification Information (II) MDO; its content is:

Mandatory Content

1. Date of submission of RP Content to MACAO: (YYYY-MM-DD form, where YYYY is year, MM is month of year, and DD is day of month)
2. Revision number of RP Content: (revision 1 is initial *revision version*)
3. Brief title identifying RP Content, in 40 characters or less.
4. Brief description, in English, of the nature and expected usage of the RP Content, in 100-200 characters.
5. Identification of RP Originator: Name, Affiliation, Address, Electronic Mail Address, *Telephone Number*.
6. Identification of Revising Authority if different from RP Originator: Name, Affiliation, Address, Electronic Mail Address, *Telephone Number*.
7. Revision Type for RP Content: REVISABLE, or NON-REVISABLE
8. Release date for RP Content dissemination to requestors: (YYYY-MM-DD form, where YYYY is year, MM is month of year, and DD is day of month)

Optional Content

9. List of ~~MACAO~~ ADIDs *that* correspond to previously registered ~~MACAO~~ MDOs that do not appear in the RP, but are referenced by their ADID in the RP Content. These ADIDs are called Referenced *MDO* MACAO ADIDs. *Although optional, this list will support verification and construction of DDPs.*
10. List of ~~CCSDS~~ ADIDs corresponding to *CCSDS* Recommended MDOs that do not appear in the RP, but are referenced by their ADID in the RP Content. These *ADIDs* are called Referenced *MDO* CCSDS ADIDs.

The II MDO shall be identified and expressed in conformance with CCSDS Recommendations and MACAO requirements. Additional requirements may appear in future Recommendations.

5.2.1.2.2 The remainder of the RP shall be one or more MDOs as provided by the RP Originator. *This may be either MDOs just being registered or those that have been previously registered.* Additional requirements on RP Content and ~~expression~~ form may appear in future Recommendations.

5.2.1.3 MACAO ADID Assignment

The MACAO shall verify that all required information has been received and, if this information demonstrates that the RP also meets internal Agency requirements for registration, a unique MACAO ADID which identifies the RP Content shall be assigned. *This verification includes checking for the existence of any Referenced MDOs whether they be archived locally or at another MACAO.* This ADID shall be represented as follows:

XXXXZZZZ = MACAO ADID, comprised of an eight RA character sequence

Where XXXX = ~~MACAO~~ CAID, comprised of a four RA character sequence which uniquely identifies the MACAO (See Section 2.1)
 ZZZZ = Local MACAO MDO identifier, called the Data Description Identifier (DDID), comprised of a four RA character sequence, which shall be chosen by the MACAO to make the MACAO ADID unique.

Additional restrictions may be applied by individual MAs.

5.2.1.4 Registration Response/Acknowledgement

The MACAO shall send a response to the RP Originator within five working days of receipt of the RP. In this response, the MACAO shall either provide the MACAO ADID assigned, or give an explanation for the delay or the inability to make an assignment.

5.2.2 MACAO MDO Dissemination

Upon receipt of a request for the MDO registered under a given MACAO ADID, the MACAO shall assemble a DDP that contains the requested MDO, *and optionally as well as, all other MDOs corresponding to the Referenced MDO MACAO ADIDs.* These Referenced *MDO* MACAO ADIDs may have been registered at other MACAOs. The latest revision of an MDO will be the default MDO for dissemination.

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The request for dissemination is satisfied by receipt of the desired MDO(s) by the Requestor. In the case where there is a Referenced MDO that must be obtained from another MACAO, dissemination is not complete until the Requestor has received all the desired MDOs (or explanation for any omissions from the DDP). When the request is received from another MACAO, the DDP shall be disseminated in SFDU form.

5.2.2.1 Release Dates

The MACAO shall verify that the current date exceeds all the release dates for the MDOs within the DDP. If all release dates are exceeded, the DDP may be released. *If there are Referenced MDOs within the requested MDO, the local MACAO will check the release date for any requests it receives from another MACAO. If the release dates are 'anticipated release dates', the requesting MACAO shall be informed that the MDO cannot be disseminated, and shall be provided with the anticipated release date by the local MACAO.*

The MACAO shall verify that the current date exceeds all the release dates for the MDOs within the DDP. If all release dates are exceeded, the DDP may be released.

Any release dates that occur after the current date are referred to as an 'anticipated release date.' If one or more MDOs in the DDP has an anticipated release date, the MACAO shall determine the identity of the RP Originators (or Revising Authorities) associated with these release dates and compare them with the identity of the current requestor. If the requestor is either a RP Originator or a Revising Authority for all MDOs with anticipated release dates, the DDP may be released to this requestor.

If the requestor identity does not match all of the RP Originators (or Revising Authorities) associated with anticipated release dates, then the MACAO shall notify the requestor of its inability to supply MDOs prior to their release dates, and shall provide the anticipated release date for the DDP.

5.2.2.2 DDP Identification

The DDP shall contain, as its identifier, the MACAO ADID of the MDO requested.

5.2.2.3 DDP Dissemination

The MACAO shall provide the latest revisions of the MDOs making up the DDP, but earlier revisions shall be provided if specifically requested.

The MACAO shall negotiate with the requestor to provide the DDP on a medium that is acceptable to both, but the final decision rests with the MACAO. The use of electronic media is highly desirable. *If the DDP includes Referenced MDOs, the MACAO with which the original request was submitted shall negotiate with the MACAO responsible for the Referenced MDO to determine the mutually-supported medium in which the DDP shall be provided.*

5.3 MACAO MDO REVISIONS

Revisions of a description of a set of data are intended to continue to apply to that set of data. Changes would be to correct an error or to improve the semantics of a description. Any changes to the description must continue to apply to all existing data carrying the associated ADID. The RP Originator or Revising Authority shall ensure that revisions do not impact users of any existing data sets for that ADID.

5.3.1 Revision Authorities

The MACAO shall only accept revisions to a registered MDO when they are provided by the recognized RP Originator, or Revision Authority, of the MDO.

5.3.2 Revision Periods

All MDOs registered with a MACAO may be revised until their release dates are exceeded.

Once their release dates are exceeded, only those MDOs with a revision type of 'Revisable' may be revised.

5.3.3 Revising MDOs

An MDO intended to revise an existing registered MDO under a specified MACAO ADID shall be submitted to that MACAO in the form of a Revising Registration Package. Unless otherwise arranged with the MACAO, the Revising RP shall contain a complete replacement for the MDO, and only for the MDO, registered under the specified MACAO ADID. The RP Originator (or Revising Authority) is responsible for assuring that the changes to the MDO do not invalidate the use of the revised MDO against any data associated with the MACAO ADID. The submission requirements for the Revising RP are categorized and discussed separately below as RP Presubmission Information and RP Content.

5.3.3.1 Revising RP Presubmission Information

The RP Presubmission Information must be complete enough to enable the MACAO to find and extract the RP Content from the underlying medium on which the RP is submitted.

5.3.3.1.1 RP Presubmission Information shall include:

1. Specification of the physical or electronic media on which the RP is being supplied.
2. Mapping information relating the RP Content to the physical or electronic media on which it is being supplied.

5.3.3.1.2 The RP Presubmission Information must be negotiated with the MACAO using the communication methods of Section 5.1, or other methods acceptable to the MACAO, prior to submission of the RP to the MACAO. Once negotiated, unless changes occur, there is no need to submit presubmission information for future transmissions. The actual presubmission information requirements are determined by the individual MACAOs.

5.3.3.2 Revising RP Content

The RP Content shall be viewed as an MDO comprised of a sequence of two or more MDOs.

CCSDS RECOMMENDATION FOR SFDUs: CONTROL AUTHORITY PROCEDURES

5.3.3.2.1 The 'first' MDO in the RP is called the Identification Information (II) MDO; its content is:

Mandatory Content

1. Date of submission of RP Content to MACAO: (YYYY-MM-DD form, where YYYY is year, MM is month of year, and DD is day of month)
2. Revision number of RP Content: (Revision 2 or above)
3. MACAO ADID whose MDO is to be revised.
4. Brief title identifying RP Content, in 40 characters or less.
5. Brief description, in English, of the nature and expected usage of the RP Content, in 100-200 characters.
6. Brief description, in English, of the nature and significance of the revision, in 100-200 characters.
7. Identification of RP Originator: Name, Affiliation, Address, Electronic Mail Address, *Telephone Number*.
8. Identification of Revising Authority if different from RP Originator: Name, Affiliation, Address, Electronic Mail Address, *Telephone Number*.
9. Revision Type for RP Content: REVISABLE, or NON-REVISABLE
10. Release date for RP Content dissemination to requestors: (YYYY-MM-DD form, where YYYY is year, MM is month of year, and DD is day of month)

Optional Content

11. List of ~~MACAO~~ ADIDs *that* corresponding to previously registered MACAO MDOs that do not appear in the RP, but are referenced by their ADID in the RP Content. These ADIDs are called Referenced MDO MACAO ADIDs.
12. List of CCSDS ADIDs *that* corresponding to Recommended MDOs that do not appear in the RP, but are referenced by their ADID in the RP Content. These ADIDs are called Referenced MDO CCSDS ADIDs.

The II MDO shall be identified and expressed in conformance with CCSDS Recommendations and MACAO requirements. Additional requirements may appear in future Recommendations.

5.3.3.2.2 The remainder of the RP shall be one or more MDOs as provided by the RP Originator. Additional requirements on RP Content and form may appear in future Recommendations.

5.3.3.3 Verification

The MACAO shall verify that all required information for revising a registered MDO has been received. The MACAO shall perform consistency checks to ensure that the correct MDO is being revised, including the following:

CCSDS RECOMMENDATION FOR SFDUs: CONTROL AUTHORITY PROCEDURES

1. Verify that the RP Originator is either the RP Originator or the Revising Authority for the MDO being revised.
2. Verify that the submitted revision number is the next revision number expected.
3. Verify that the brief title is the same, or very similar, to the previous one.
4. Verify that the brief description is the same, or very similar, to the previous one.

Should these checks show any discrepancies, the MACAO shall contact the RP Originator or Revising Authority for clarification.

Upon successful completion of the verification checks, the RP Content shall become the MDO to be disseminated under the specified MACAO ADID.

5.3.3.4 Revision Response/Acknowledgement

The MACAO shall send a response to the RP Originator within five working days of receipt of the RP. In this response, the MACAO shall either acknowledge a successful revision, or give an explanation for the delay or inability to make the revision.

5.3.3.5 Replaced Revision Archiving and Requesting

An MDO that has been replaced by a revision shall be permanently maintained. It may be requested by identifying both its MACAO ADID and its revision number to the MACAO.

5.4 MACAO ANNUAL REPORT PROTOCOL

Each primary MACAO shall provide the CA Agent with an annual report containing the following information:

1. All MACAO IDs, organizational structure, locations, and access methods
2. For all MDOs registered with the MACAO, the following information:
 - a. MACAO CA ID
 - b. Brief title (40 characters or less)
 - c. Revision number of MDO
 - d. Brief description, in English, of MDO (100-200 characters)
 - e. MDO revision type (Revisable or Non-revisable)
3. Summary of MACAO request activity statistics, including the following:
 - a. Number of MACAO ADIDs assigned during the past year
 - b. Number of MDOs revised during the past year
 - c. Number of requests received during the past year
4. All registered MDOs that may be candidates for standardization

CCSDS RECOMMENDATION FOR SFDUs: CONTROL AUTHORITY PROCEDURES

5.4.1 MACAO Annual Report Submission

The primary MACAO shall submit the report to the CA Agent by January 31 of the following year.

The medium on which the report is submitted shall be negotiated with the CA Agent, but electronic media are preferred.

ANNEX A

ACRONYMS AND TERMINOLOGY

(THIS ANNEX **IS** PART OF THE RECOMMENDATION)

Purpose:

This annex defines the key acronyms and terms which are used within this Recommendation to describe the concepts and elements of CA services and operations.

A ACRONYMS AND TERMINOLOGY

A.1 ACRONYMS

ADID	Authority and Description Identifier
ASCII	American Standard Code for Information Interchange
CA	Control Authority
CAID	Control Authority Identifier
CCSDS	Consultative Committee for Space Data Systems
DDID	Data Description Identifier
DDP	Data Description Package
ID	Identifier
II	Identification Information
ISO	International Organization for Standardization
MA	Member Agency
MACAO	Member Agency Control Authority Office
MDO	Metadata Object
RA	Restricted ASCII
RP	Registration Package
SFDU	Standard Formatted Data Unit
WDC-A-R&S	World Data Center - A for Rockets and Satellites

A.2 TERMINOLOGY

Anticipated Release Date: a Release Date that will occur after the current date.

Archive: a place in which data are preserved. Typically, an archive will provide services for storing and cataloging collected data, and for retrieving selected data upon request.

ASCII: The term used to identify the American Standard Code for Information Interchange. It consists of a 7-bit code, found in the least significant bits of 8-bit bytes (octets). The code consists of two character sets: a Control (C) set and a Graphics (G) set. The control set, occupying positions 0/0 (0 hex) through 1/15 (1F hex), is described in ANSI 3.4-1986 and in ISO 646-1983. The graphics set, occupying positions 2/0 (20 hex) through 7/15 (7F hex), is described in ANSI 3.4-1986; and as the G0 set of ISO 8859-1:1987 plus space. The graphics set is also the same as the IRV version of ISO 646, with the exception of positions 2/4 (24 hex) and 7/15 (7F hex), which contain dollar (\$) and tilde (~) respectively, in the ASCII set, and currency and overscore in ISO 646.

Authority and Description Identifier (ADID): the concatenation of the Control Authority Identifier (CAID) and the Data Description Identifier (DDID).

Character: a member of a finite set of symbols which together constitute a basic set of elements supporting a language.

Control Authority (CA): a collection of CCSDS MA organizations (Control Authority Offices), under the auspices of the CCSDS Secretariat, responsible for registering, archiving, and distributing the data descriptions, i.e., metadata, upon request.

Control Authority Agent (CA Agent): an organizational entity that has agreed to provide resources in supporting the discharging of the CA responsibilities of the CCSDS Secretariat. The WDC-A-R&S has been requested to act as this agent. Overall CA responsibility rests with the CCSDS Secretariat.

Control Authority Identifier (CAID; CA ID): an identifier which is unique within the CCSDS sphere of influence and which identifies an individual CA office or CCSDS.

Data: the representation forms of information dealt with by information systems and their users.

Data Description Package (DDP): an MDO instance, to be disseminated by a MACAO and possibly comprised of other MDO instances, that carries its instance-identifier, which is called an ADID.

Data Description Identifier (DDID): an identifier which is assigned by and is unique within an individual CA office or CCSDS, and which identifies the data definition information associated with data of interest.

Data Element: the smallest named item or items of data for a given application.

Data Entity: an identified collection of data.

Data Object: a collection of data elements that are aggregated for or by a specific application.

Data System: a system of an enterprise with the goal to provide services which satisfy the information needs of the enterprise. Major operating facilities of the data system are: physical storage, data management, data retrieval, and data manipulation.

Data Unit: a collection of data objects which form a single data interchange entity.

Exceeded Release Date: a Release Date which has already occurred, or is equal to the current date.

Field: an abstract component of a data unit that is assigned a length and a representation. Fields may be divided into sub-fields which may be used as fields.

Format: the assignment of each data element of a data object to a field and to a specific location or address in a given space.

Global: pertaining to the CCSDS sphere of influence.

Information: Any kind of knowledge that is exchangeable among users.

Instance: an occurrence that exhibits the distinguishing characteristics of its class.

Interpret: to explain or present in understandable terms. SDFU interpretation is the process of recognizing the format of a data entity, identifying its component parts, and extracting and presenting the information it carries.

Language: a definition comprised of a grammar and associated semantics.

Member Agency Control Authority Office (MACAO): an individual CCSDS-Member-Agency organization that has accepted the operational responsibilities and constraints of CCSDS Recommendations on CA operations.

Metadata: data about other data.

Metadata Object (MDO): an identified collection of metadata.

Non-Revisable MDO: an MDO, registered with a MACAO, that may not be revised once its Release Date is exceeded.

Open Data System: a data system which offers its service to customers outside the enterprise. These outside customers need to know how to operate a service access port. Thus they must be able to : (a) communicate with the system, (b) request data services, (c) accept data products, and (d) elaborate the structure of these products according to standard protocols and structuring rules defined in the public domain.

Protocol: the preliminary procedures required in establishing a level of communication between two or more parties.

Referenced ADID: ~~an ADID that identifies a previously registered RP, the DDP for which does not appear in the referencing RP. It may appear in a label or within an MDO within the referencing RP.~~

Referenced MDO: *a previously registered MDO, whose ADID appears in the referenced MDO.*

Referenced MDO CCSDS ADID: *the ADID of a referenced MDO that is specified by a CCSDS Recommendation.*

Referenced MDO MACAO ADID: *the ADID of a referenced MDO which was registered by a MACAO and is included in a referencing MDO.*

Registration Package (RP): an instance of a data description, that may refer to other data descriptions, and that is intended to be registered by a MACAO. Registration implies the assignment of a unique ADID. The instance is referred to as an MDO.

Release Date: the date on which, or after which, the content of the Registration Package may be provided to requestors other than the RP Originator or the RP Revising Authority.

Restricted ASCII (RA) Character: a character from the ASCII character set consisting of the numeric characters 0-9, and the upper case letters, A-Z, of the Roman alphabet.

Revisable MDO: an MDO, registered with a MACAO, that may be revised at the direction of the RP Originator or the RP Revising Authority.

Revising Authority: that individual or organization that has been designated, in the registration of an MDO with a MACAO, as having the authority to submit a revision to that MDO.

Revising Registration Package: an MDO instance that is submitted to a MACAO with the intent of revising an existing MDO previously registered with the MACAO. The MDO to be revised is identified by its ADID within the Revising RP.

RP Originator: that individual or organization that submits the Registration Package to a MACAO and accepts responsibility for the RP content.

Service: work performed for the benefit of others. Numerous services are involved in the operation of open data systems, including: data collection, conversion, and storage; communication services; archive services such as catalog queries and data distribution; and control authority services such as registration and distribution of data descriptions.

Standard Formatted Data Unit (SFDU): data units that conform to CCSDS Recommendations for structure, construction rules, and field specification definition.

EACH _____ INTENTIONALLY BLAND

ANNEX B
DATA LANGUAGE RECOMMENDATION
(THIS ANNEX **IS** PART OF THE RECOMMENDATION)

Purpose:

This annex defines a data language that may be used to describe data.

B DATA LANGUAGE RECOMMENDATION

The following data language is Recommended for use with SFDUs as follows:

ADID: CCSD0002

NAME: English/ASCII

DEFINITION: English is defined to be the 'natural language' English' in text form, and when also in digital form, shall be represented by ASCII coding. To allow multiple line formatting to be preserved across environments, a standard line delimiter must be used. The line delimiter chosen for CCSD0002 is TBD.

The relevant dictionary may be found in the open literature as:

OXFORD ENGLISH DICTIONARY, 2nd Edition. Prepared by J.A.Simpson & E.S.C. Weiner. Publisher: Clarendon Press, 1989.

USAGE: English may be used where automated parsing is not required, or no other suitable data language is available (e.g., expressing complex semantics). No other 'natural language' is expected to be approved in order to encourage the expression of data structures in a parseable data language.

ANNEX C
MEMBER AGENCY, MACAO, AND RESERVED IDs

(THIS ANNEX **IS** PART OF THE RECOMMENDATION)

Purpose:

This annex defines each Member Agency ID character and the ID characters of each Agency's MACAOs at the time of publication of this Recommendation. A current list may be obtained from the CA Agent identified in Annex D E. This Annex C also defines a list of reserved CAIDs.

C MEMBER AGENCY, MACAO, AND RESERVED IDs

C.1 MA AND MACAO IDs

MA: British National Space Center (BNSC)/United Kingdom

Agency ID: B

Primary MACAO ID: BNSC

MA: Canadian Space Agency/Canada

Agency ID: D

MA: Centre National d'Etudes Spatiales (CNES)/France

Agency ID: C

Primary MACAO ID: CCST

MA: Deutsche Forschungsanstalt Fur Luft und Raumfahrt e.V (DFVLR)/West Germany

Agency ID: G

Primary MACAO ID: GSOC

MA: European Space Agency (ESA)/Europe

Agency ID: E

Primary MACAO ID: ESOC

MA: Instituto de Pesquisas Espaciais (INPE)/Brazil

Agency ID: I

MA: National Aeronautics and Space Agency (NASA)/U.S.A.

Agency ID: N

Primary MACAO ID: NSSD

Descendant MACAO IDs: NJPL

MA: National Space Development Agency of Japan (NASDA)/Japan

Agency ID: A

C.2 RESERVED CA IDs

The following CA IDs are reserved:

<u>Reserved CA IDs</u>	<u>Description</u>
CCSD	Used to uniquely identify a CCSDS ADID that is assigned by CCSDS.
Zxxx	An ADID in which the MA ID=Z is understood to refer to a special use, regardless of the following 3 octets.
VOLx, HDRx, EOvx, EOFx	Here 'x' is any RA character. An ADID in which the CA ID appears to be any of these 4-octet strings is understood to be an invalid ADID. This avoids any possible confusion between these ISO standard tape labels (ISO 1001) and a CCSDS or MACAO ADID.

100-100000-100000

ANNEX D

CONFORMANCE MATRIX

(THIS ANNEX **IS** PART OF THE RECOMMENDATION)

Purpose:

This annex specifies the minimum conformance criteria for the CA Agent and MACAOs. It also identifies those conformance elements that are important for determining CA cross-support.

D CA PROCEDURES CONFORMANCE MATRIX

The following services, provided as conformance statements in this annex, are either mandatory, optional, or not applicable (NA) for the Control Authority Agent or MACAO. To interpret this matrix, use the following legend:

- YES means that the requirement must be met by that organization in order to be conformant with this Recommendation.
- NA means the requirement is not applicable to that organization
- ?? means that provision of this service is optional and must be verified with the Member Agency to determine cross-support.
- * primary MACAO only

Each MACAO shall provide its response to the conformance matrix to its ascendant MACAO; each primary MACAO shall provide the conformance matrices to the CA Agent.

To use this matrix to determine the degree of cross-support, each organization should indicate its conformance to each statement having a "??" for that organization. Non-conformance with the Recommendation will occur when organizations do not support statements having a "YES" for that organization.

CONFORMANCE STATEMENT	CA AGENT	MACAO
1. Provides Basic Mandatory Services for:		
1. Request Processing (See 3.1.1/3.2.1).....	YES	YES
2. Registration/Dissemination (See 3.1.2/3.2.2)	YES	YES
3. Publication (See 3.1.3/3.2.3).....	YES	YES
4. Archiving (See 3.1.4/3.2.4)	YES	YES
5. Communication methods (See 4.1/5.2):		
Mail	YES	YES
Telephone	YES	YES
Facsimile	YES	YES
Electronic Mail	YES	YES
6. Member Agency ID Registration (See 4.2/NA).....	YES	NA
7. MACAO ID Registration (See NA/4.3).....	NA	YES
8. CCSDS Recommendation Dissemination (See 3.1.2/NA)	YES	NA
9. CA Agent Annual Report (See 3.1.3/3.2.3)	YES	YES*NA
10. MACAO MDO Registration/Dissemination (See NA/3.2.2)	NA	YES
11. MACAO Annual Report (See NA/3.2.3).....	NA	YES
12. Permits Referenced MDO ADIDs in Registration		
Packages (NA/3.2.2)	NA	YES
13. Obtains MDOs corresponding to Referenced MDOs ADID for inclusion in DDP corresponding to requested ADID (NA/3.2.2)	NA	YES
14. Registers organizational structures, access methods (2.2.1/2.3.1)....		
2. Provides Extended Optional Services for:		
15. Registration, archiving and dissemination services for SFDU software (2.2.2/2.3.2).....	?? YES	??
16. Support identifying and locating SFDU software (2.2.2/2.3.2).....	?? YES	?? NA
17. Information about and availability of MACAO ADIDs (2.2.1/2.3.1).....	YES	YES ??

18.	Assisting SFDU users in locating sources of needed services ... ??	YES	??
19.	Establishing descendant MACAOs (NA/2.3.2)	NA	??
20.	Provides guidelines to descendant MACAOs (NA/2.3.1)	NA	YES
21.	Providing feedback to ascendant MACAO/CA-Agent on CCSDS Recommendations and Reports (NA/2.3.2)	NA	??
22.	Registration of Revisable RPs (NA/3.2.2)	NA	??
23.	Fixed Presubmission Requirements (NA/5.2.1.1.2)	NA	??

Legend:

- ~~— Yes means that the requirement is met by that organization in a manner conformant with this Recommendation.~~
- ~~— NA means not applicable to that organization~~
- ~~— ?? means that provision of this service t be verified with the Member Agency to determine cross support.~~

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ANNEX E

CA LOCATIONS AND ACCESS METHODS

(THIS ANNEX IS **NOT** PART OF THE RECOMMENDATION)

Purpose:

This annex provides the CA locations and the methods of access at the time of Recommendation publication.

E CA LOCATIONS AND ACCESS METHODS

The CA Agent will maintain a current list of MACAO locations and access methods. The CCSDS Secretariat will maintain information on how to contact the CA Agent. The current location of, and access to, the CA Agent is as follows:

CA Agent

World Data Center A for Rockets and Satellites

CA ID = CCSD

Location: Building 26, Goddard Space Flight Center, Greenbelt, Maryland, U.S.A.

Access Methods:

Mail -

World Data Center A for Rockets and Satellites
Code 630.2
Goddard Space Flight Center
Greenbelt, Maryland 20771, U.S.A.
ATTN: CCSDS CONTROL AUTHORITY AGENT

Telephone -

(301) 286-6695

Facsimilie

(301) 286-9803

Telex No.-

89675 NASCOM GBLT

Electronic Mail -

- 1) Telemail address is:
[CCSDCAA/GSFCMAIL] GSFC/USA
- 2) To be established on approval of this Recommendation
SPAN (Space Physics Analysis Network) address is:
NCF::CCSDCAA
- 3) NSN (NASA Science Network) address is:
CCSDCAA@NSSDCA.GSFC.NASA.GOV
(OR)
CCSDCAA@128.183.10.4



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